

# Claims

- [c1] 1. A frequency harmonic identifier system for a circuit interrupter, the system comprising:  
a frequency analyzer for receiving an input signal and providing an output representing a tested signal;  
a storage area containing at least one reference signal band; and,  
a decision logic, wherein the decision logic compares the tested signal to the at least one reference signal band for determining if the tested signal is a series arc signal or a load.
- [c2] 2. The system of claim 1 wherein the frequency analyzer provides a Fast Fourier Transform of the input signal and a band selector for selecting bands of the Fast Fourier Transform input signal for comparing to the at least one reference signal band.
- [c3] 3. The system of claim 1 wherein the input signal is a sensed current on a power line.
- [c4] 4. The system of claim 1 wherein the storage area contains a plurality of sets of reference signal bands.

- [c5] 5. The system of claim 4 wherein the sets of reference signal bands are classified according to highest magnitude harmonics within frequency bands.
- [c6] 6. The system of claim 1 wherein the at least one reference signal band represents at least one common load.
- [c7] 7. The system of claim 1 wherein the decision logic compares harmonic content of selected bands of the tested signal to harmonic content of each of the at least one reference signal band.
- [c8] 8. The system of claim 1 wherein a circuit interrupt decision is made based on the decision logic comparison, wherein, if the tested signal is determined to be a series arc signal by the decision logic, then a trip signal is sent from the frequency harmonic identifier.
- [c9] 9. A circuit interrupter with series arc detection capability, the interrupter comprising:  
a pair of separable contacts for interrupting a circuit;  
a frequency harmonic identifier system having:  
a frequency analyzer for receiving an input signal and providing an output representing a tested signal;  
a storage area containing at least one reference signal band; and,  
a decision logic, wherein the decision logic compares the

tested signal to the at least one reference signal band for determining if the tested signal is a series arc signal or a load;

wherein a trip signal is sent from the frequency harmonic identifier if the tested signal is determined by the decision logic to be a series arc signal, and wherein the pair of separable contacts are separated after issuance of the trip signal.

[c10] 10. The circuit interrupter of claim 9 further comprising at least one of a current sensor and a shunt resistor for sensing current on the circuit for use as the input signal.

[c11] 11. The circuit interrupter of claim 9 wherein the frequency harmonic identifier is provided within a microprocessor within the interrupter.

[c12] 12. The circuit interrupter of claim 9 wherein the storage area is a memory accessible by the decision logic.

[c13] 13. The circuit interrupter of claim 9 wherein the frequency analyzer provides a Fast Fourier Transform of the input signal and a band selector for selecting bands of the Fast Fourier Transform input signal for comparing to the at least one reference signal band.

[c14] 14. The circuit interrupter of claim 9 wherein the storage area contains a plurality of sets of reference signal bands

classified according to highest magnitude harmonics within frequency bands and wherein the at least one of the plurality sets of reference signal bands represents at least one common load.

[c15] 15. The circuit interrupter of claim 9 wherein the decision logic compares harmonic content of the tested signal to harmonic content of each of the at least one reference signal band.

[c16] 16. A method for detecting series arcs in a circuit interrupter, the method comprising:  
sensing current on a power line and providing a sensed current signal as an input signal to a frequency harmonic identifier;  
performing a Fast Fourier Transform on the input signal and selecting bands of the Fast Fourier Transform input signal for providing tested signal bands;  
accessing a storage area storing at least one reference signal band;  
comparing the tested signal bands to the at least one reference signal band and determining if the input signal is a series arc signal through comparison; and,  
if the input signal is a series arc signal, sending a trip signal.

[c17] 17. The method of claim 16 wherein the at least one ref-

erence signal band is a plurality of sets of reference signal bands representing a plurality of common loads.

[c18] 18. The method of claim 17 wherein determining if the input signal is a series arc signal comprises comparing harmonic content of the tested signal bands to harmonic content of each of the plurality of sets of reference signal bands.

[c19] 19. A storage medium encoded with machine-readable computer program code for detecting series arcs on a power line, the storage medium including instructions for causing a computer to implement a method comprising:

sensing current on a power line and providing a sensed current signal as an input signal to a frequency harmonic identifier;

performing a Fast Fourier Transform on the input signal and selecting bands of the Fast Fourier Transform input signal for providing tested signal bands;

accessing a storage area storing at least one reference signal band;

comparing the tested signal bands to the at least one reference signal band and determining if the input signal is a series arc signal through comparison; and, if the input signal is a series arc signal, sending a trip signal.

[c20] 20. The storage medium of claim 19 further comprising instructions for causing a computer to implement:  
comparing harmonic content of the tested signal bands to harmonic content of each of the at least one reference signal band.